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(54) Abstract Title
Collapsible tilting steering column

(57) A collapsible steering column with tilt adjustment comprises a tilting steering support structure A which includes slots A1 and partition members 4, and pivoting members 10 that are supported in a bracket B. The partition members are caused to collapse during impact to absorb the shock energy and move the steering wheel relatively forward to reduce the contact between the driver and the steering wheel.

Fig. 1A

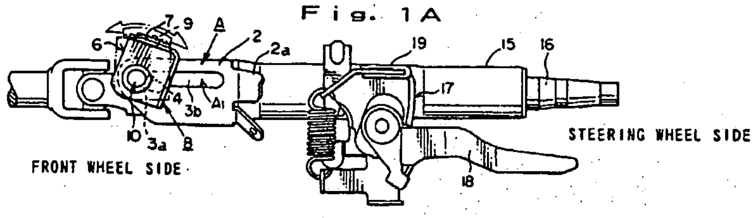
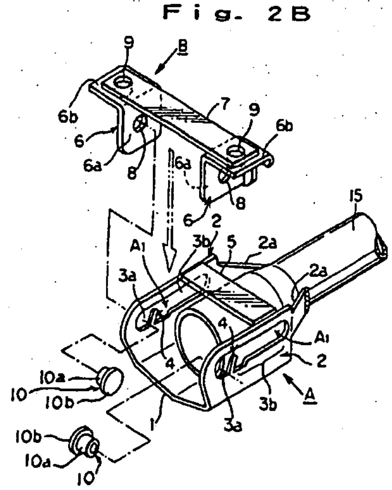


Fig. 2B



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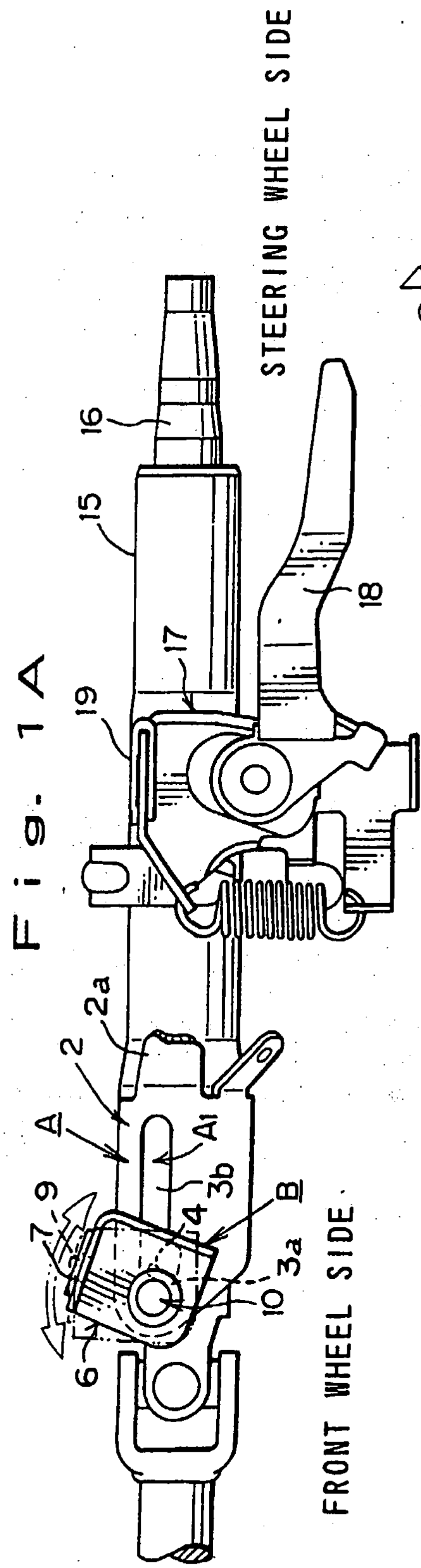

Fig. 1A

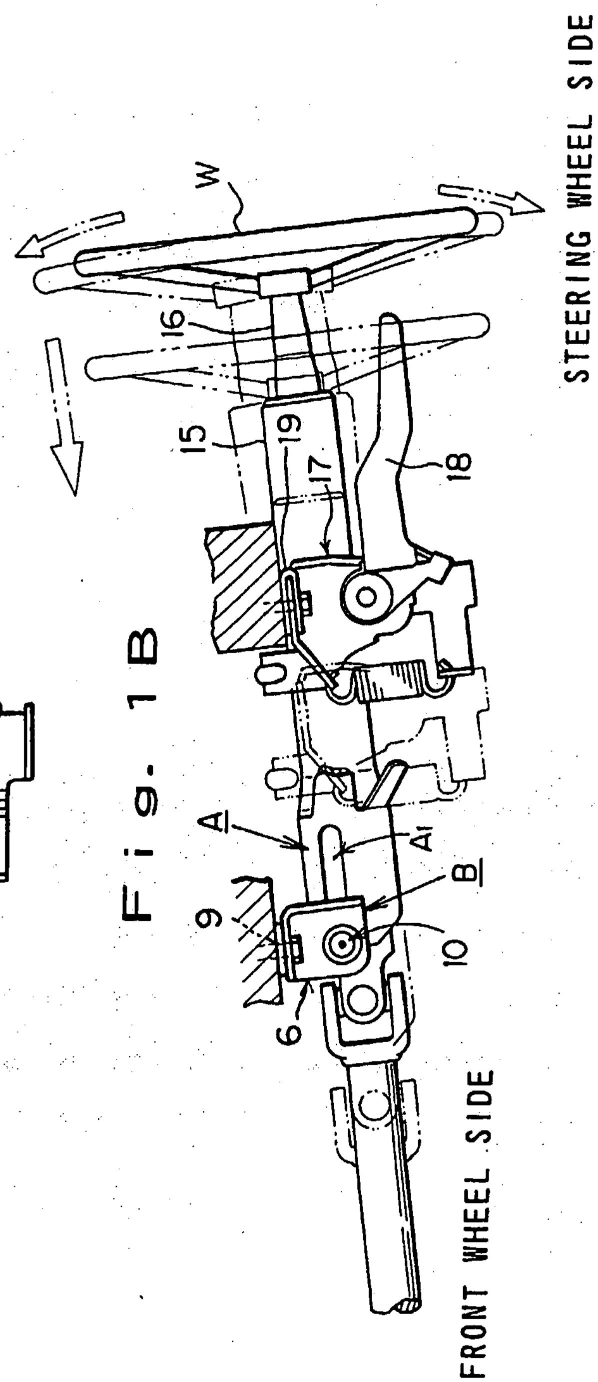

Fig. 1B

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Fig. 2A

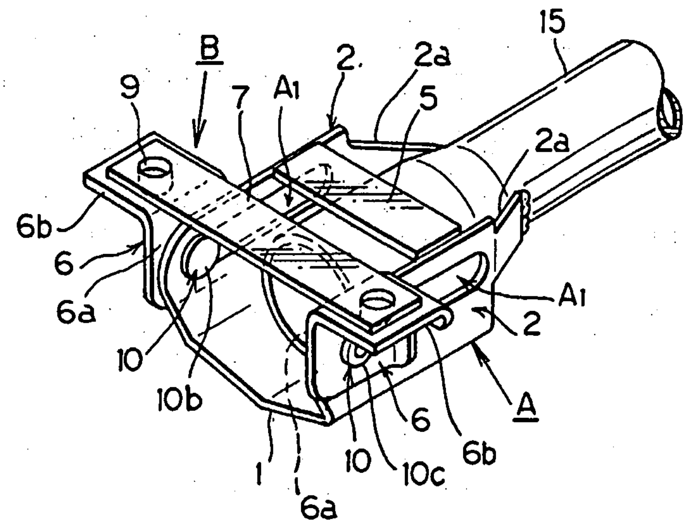

Fig. 2B

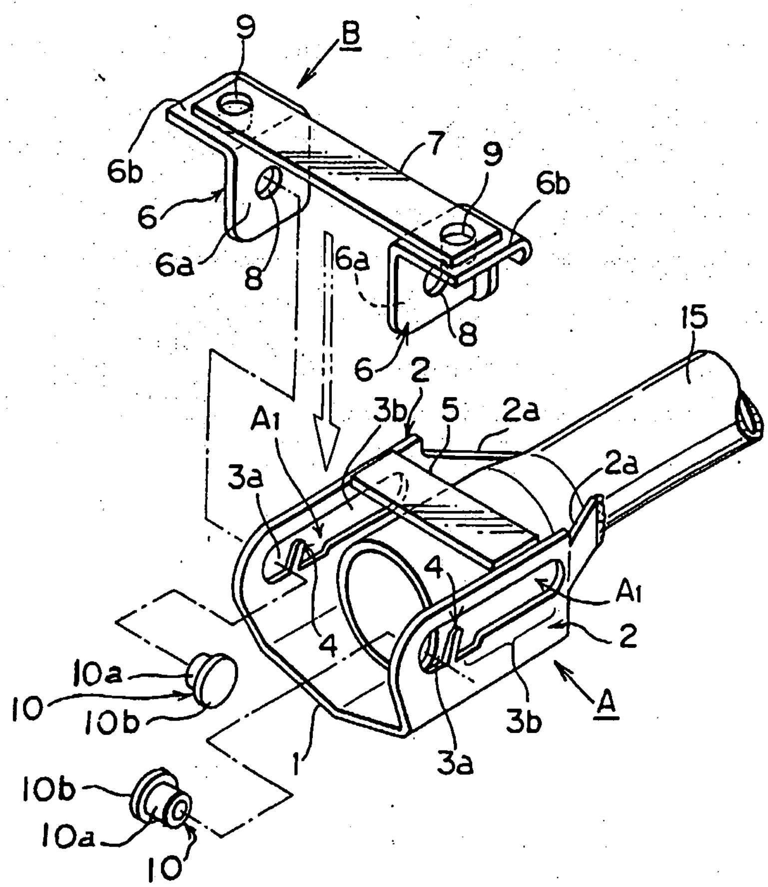

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Fig. 3A

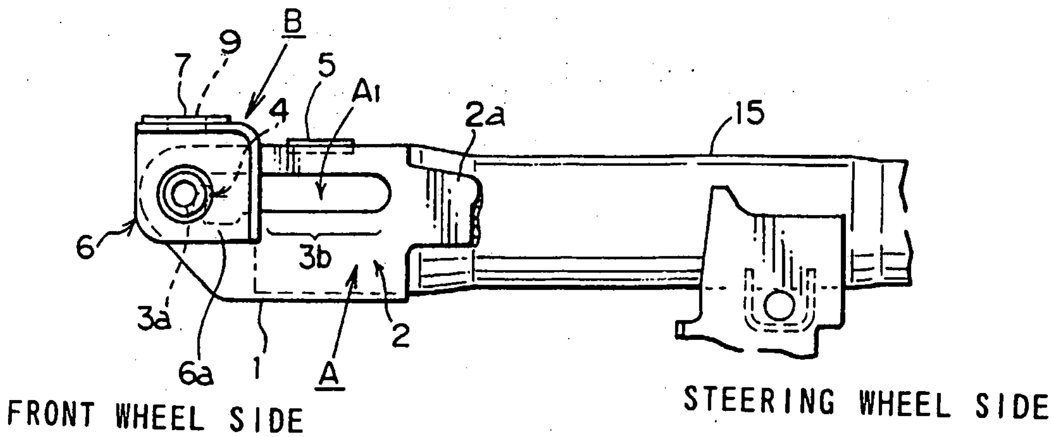


Fig. 3B

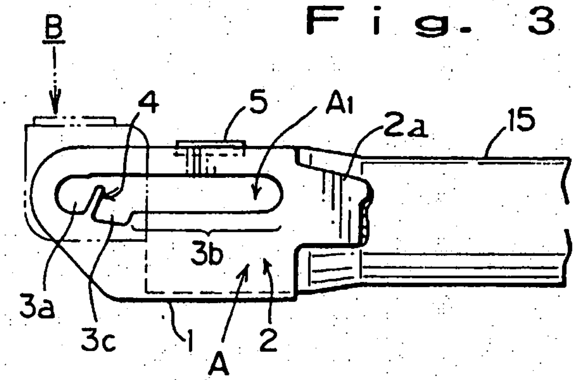


Fig. 3C

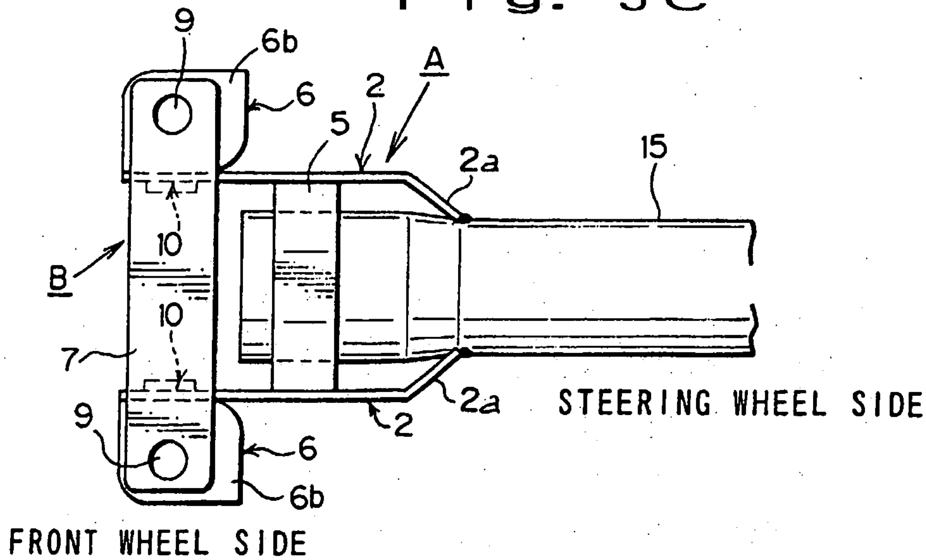
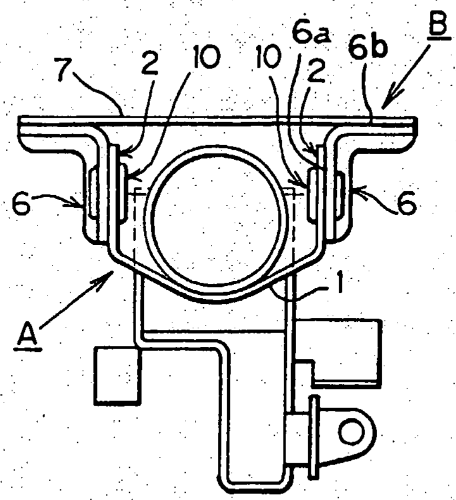


Fig. 4A Fig. 4B



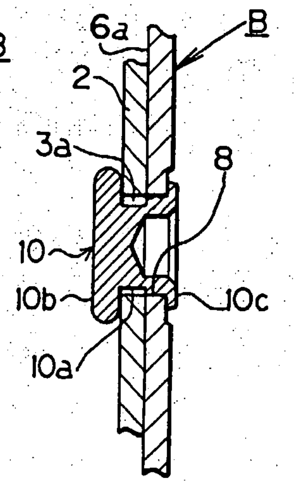


Fig. 5

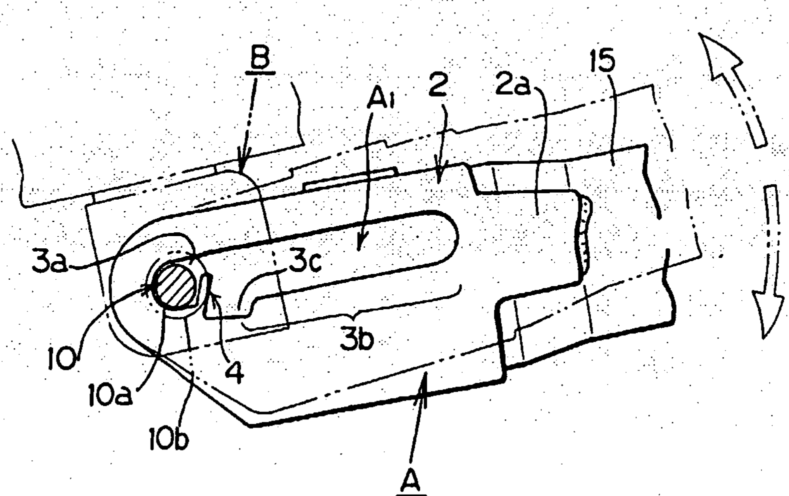


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Fig. 6A

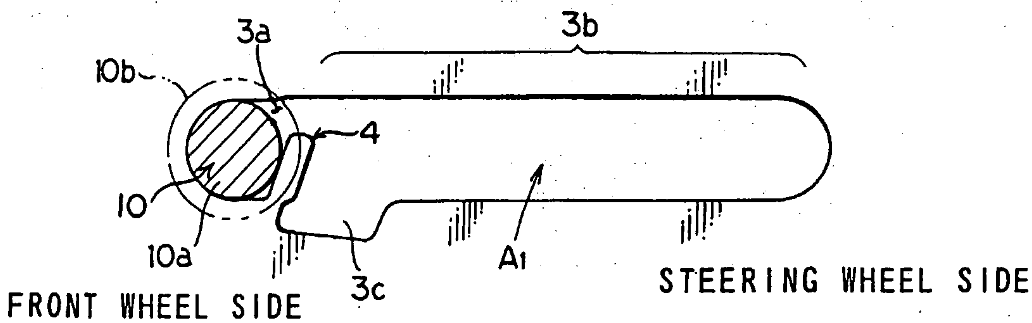

Fig. 6B

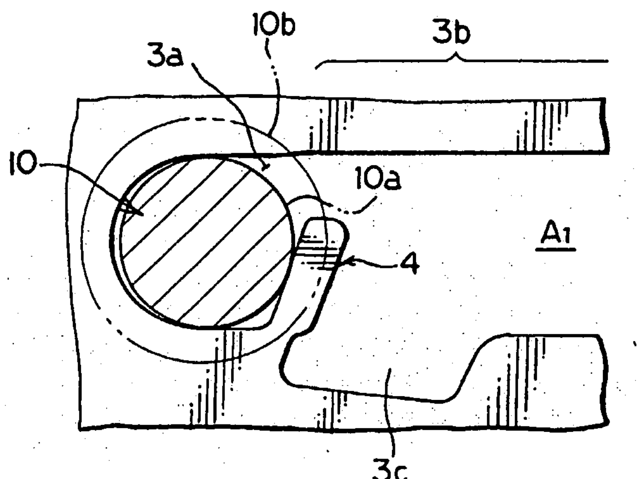

Fig. 6C

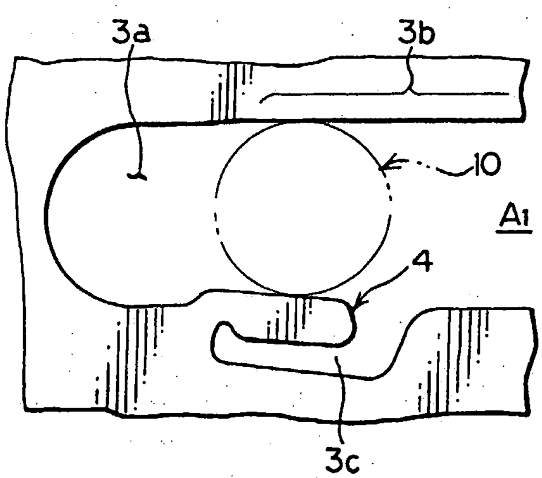

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Fig. 7A

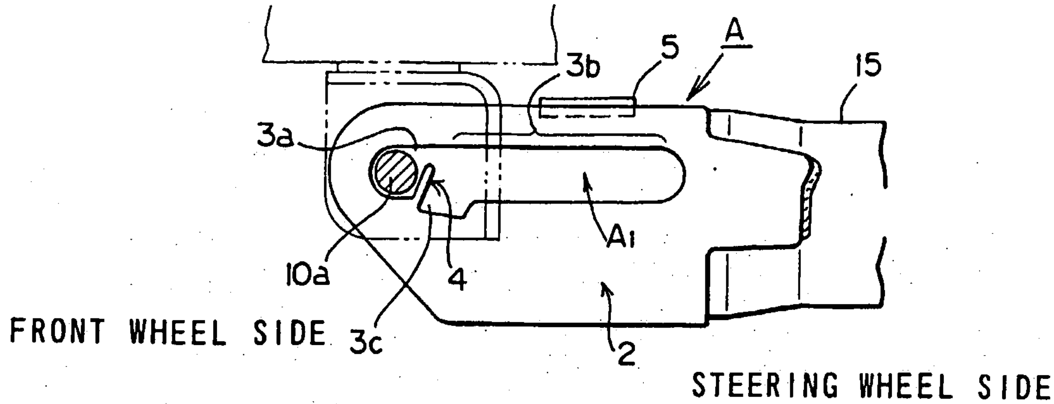

Fig. 7B

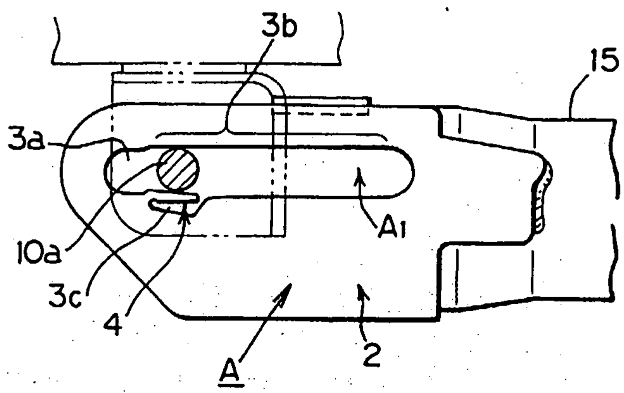

Fig. 7C

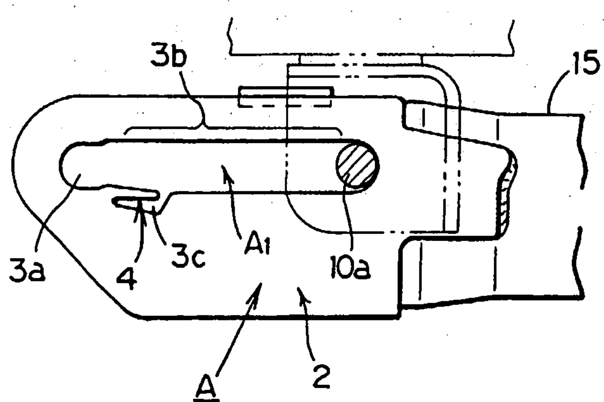

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Fig. 8A

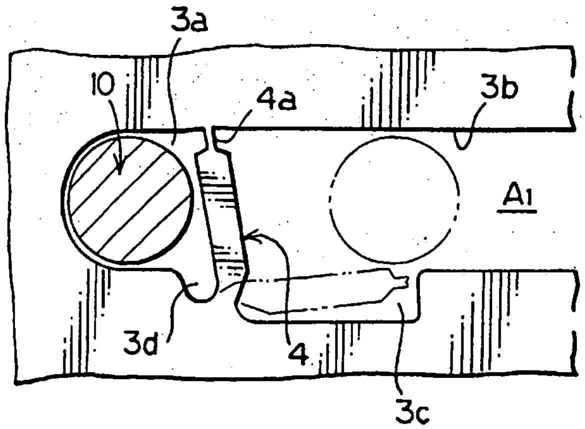


Fig. 8B

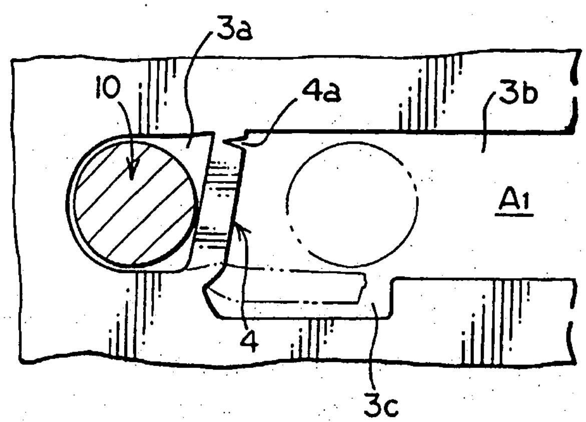
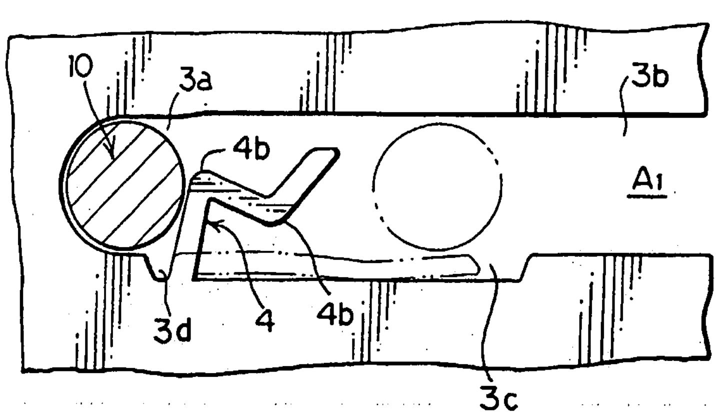


Fig. 8C



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TILT STEERING PIVOTING-SUPPORTING STRUCTURE

The present invention relates to a tilt steering pivoting-supporting structure which makes it possible to obtain a stable pivoting action in the adjustment of the tilt in the supporting structure of the pivoting center part in tilt steering, and which can absorb the shock that occurs in the case of a collision.

In the case of automobile collisions, etc., the vehicle operator may strike the steering wheel, so that an impact load is axially applied to the steering column via this steering wheel. In order to alleviate the shock applied to the steering column and protect the safety of the vehicle operator, various types of shock absorbing devices which are devised so that the steering column can move very smoothly in the axial direction while absorbing this shock are installed around the steering column.

In a steering column, two specified parts in the axial direction are generally supported on and fastened to the vehicle body side. Furthermore, the fastened part that is closer to the steering wheel is equipped with a shock absorbing mechanism which allows the steering column to slide in the axial direction toward the front wheels so that the impact energy is alleviated, thus ensuring the safety [of the vehicle operator] in cases where the vehicle operator strikes the steering wheel as a result of rebound movement during a collision.

Furthermore, the fastened part of the steering column that is closer to the front wheels is equipped with a structure which receives the action of the shock absorbing mechanism of the abovementioned fastened part that is located closer to the steering wheel so that the steering column can move smoothly toward the front wheels. This fastened part of the steering column that is located closer to the front wheels must not only allow a smooth sliding action in the case of a collision, but must also function as a tilt pivoting center of the steering column according to the tilt operation under ordinary conditions.

In the past, a tilt supporting structure for a tilt type steering apparatus has been disclosed in (for example) Japanese Utility Model Application Kokai No. Sho 62-23771 as an apparatus of this type. In this apparatus, when a

specified load acts in the axial direction of the steering column during a collision, a supporting pin moves relative to a sliding hole part so that the steering column slides toward the front wheels, thus absorbing the shock of the collision so that the vehicle operator is protected.

More specifically, when a specified load is directed toward the lower part of the steering column in the case of a collision, a bracket moves along a corresponding slot against the pushing force of the head part of the supporting pin. Furthermore, it is also disclosed that the slot of the bracket is made smaller than the diameter of the pivoting hole, so that when a specified load is applied, [the bracket] moves while the edge portions of the slot of the bracket are caused to collapse by the supporting pin. There are also various other tilt mechanisms which have slots that are substantially similar to the abovementioned slot.

In the abovementioned structure, the slot used to absorb impact energy communicates with the pivoting hole of the bracket in tilt adjustment in a state in which a cut-out is formed in the abovementioned pivoting hole; accordingly, at the point of communication with the slot, the outer-circumferential surface in the axial direction of the supporting pin is an unsupported region. As a result, the area of support (contact) is reduced, so that stable support of the bracket by the supporting pin is difficult.

Furthermore, with respect to the clearance between the supporting pin (in the radial direction) and the pivoting hole, the clearance of the supporting pin is extremely large in the area of communication between the pivoting hole and the side of the slot; as a result, the movement of the bracket is increased. This causes looseness at the time of pivoting in tilt adjustment, and it is difficult to prevent this looseness. Furthermore, it might also be possible to suppress movement in the radial direction by means of a frictional holding force based on the tightening force of the supporting pin in the axial direction; on the other hand, however, this would cause an increase in the resistance during pivoting in tilt adjustment, thus causing the movement to become heavier so that tilt adjustment is impeded. Moreover, if the width of the slot is increased, the [abovementioned] looseness is increased, while if the width is decreased, the looseness shows a corresponding decrease, but the energy absorption load in the direction of the slot increases, so that the sliding action of the steering column becomes heavier.

Furthermore, in the area of communication between the pivoting hole and the slot, the supporting pin crosses the hypothetical position of the pivoting hole in the area of communication, and moves in relative terms as far as a position at the leading end of the slot. Specifically, in the direction of communication between the pivoting hole and the slot, the

supporting pin shows an amount of movement that is greater than the clearance with the pivoting hole. This distance is related to the size of the width; by reducing the dimension of the slot in the width direction in order to improve this relationship, it is possible to reduce the width of the looseness on the slot side of the pivoting hole.

On the other hand, however, if the width of the slot is narrowed, the energy absorption load increases, so that it becomes difficult to set this load at an appropriate value. Accordingly, as described in the above, it becomes extremely difficult to realize, using a simple structure, a mechanism which makes it possible to suppress looseness of the pivoting-supporting part in the ordinary tilting operation, and also to set the energy absorption load at a wide range of appropriate loads, by setting the most favorable relationship between the supporting pin and the width of the bracket slot. An object of the present invention is to suppress the looseness that is generated in the pivoting center part in tilt steering of the type described above, to make the pivoting action stable and extremely smooth, and to improve the shock absorbing action in the case of collision.

Accordingly, the present inventor conducted diligent research in order to solve the abovementioned problem. As a result of

this research, the present invention is constructed as a tilt steering pivoting-supporting structure in which slot parts in a column-supporting member which is fastened to the front-wheel side of the steering column are connected via shaft-supporting members to a pivoting-supporting bracket which is fastened to the vehicle body side, the aforementioned shaft-supporting members are enveloped and supported at the front-wheel ends of the slot parts by partitioning members that are formed inside the aforementioned slot parts, and the aforementioned partitioning members are caused to collapse in the case of an impact so that the slot parts can move toward the front wheels relative to the aforementioned shaft-supporting members. As a result, under ordinary conditions, looseness of the pivoting center part of the steering column caused by tilt adjustment can be prevented, and the pivoting action can be performed stably and extremely smoothly. Furthermore, in the case of a collision, the sliding action of the steering column in shock absorption can be improved. Moreover, the structure can be made relatively simple, so that the abovementioned problems are solved.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1A is a side view of a steering apparatus equipped with the present invention;

Figure 1B is a side view of the steering apparatus mounted on a vehicle body;

Figure 2A is a perspective view showing the column-supporting member and pivoting-supporting bracket combined;

Figure 2B is an exploded perspective view of the column-supporting member and pivoting-supporting bracket;

Figure 3A is a side view showing the column-supporting member and pivoting-supporting bracket combined;

Figure 3B is a side view of the column-supporting member;

Figure 3C is a plan view showing the column-supporting member and pivoting-supporting bracket combined;

Figure 4A is a front view showing the column-supporting member and pivoting-supporting bracket combined;

Figure 4B is an enlarged sectional view of the essential parts of the pivoting area of the column-supporting member and pivoting-supporting bracket;

Figure 5 is an operating diagram illustrating the pivoting operation in the tilt of the present invention;

Figure 6A is an enlarged view of [one of] the slot parts;

Figure 6B is an enlarged view of essential parts which illustrates the structure of the pivoting hole part and the partitioning member;

Figure 6C is an enlarged view of essential parts showing the state in which the partitioning member is caused to collapse in Figure 6B;

Figures 7A, 7B and 7C are operating diagrams showing a state in which the slot parts slide toward the front wheels with respect to the shaft-supporting members in the case of a collision;

Figure 8A is an enlarged view of the essential parts of one of the slot parts in which a partitioning member that has a weak part is formed;

Figure 8B is an enlarged view of the essential parts of one of the slot parts in which a partitioning member that has a weak part is formed according to another embodiment that is different from the one shown in Figure 8A;

Figure 8C is an enlarged view of the essential parts of one of the slit parts in which a partitioning member that has bent parts is formed.

A preferred embodiment of the present invention will be described below with reference to the attached figures. The steering apparatus is constructed from a steering column 15 and a steering shaft 16, with the steering shaft 16 being accommodated inside this steering column 15. The steering column 15 is supported and fastened in two places on the vehicle body, i. e., one place closer to the front wheels and one place closer to the steering wheel W (see Figure 1A).

In the part where the steering column 15 is fastened to the vehicle body at a point that is closer to the steering wheel W, a column bracket 17 is mounted, and an operating lever rod 18 which is used to perform the tilting operation is mounted on this column bracket 17. Furthermore, a capsule 19 which is

used to absorb the impact energy in the case of a collision is provided (see Figure 1B).

The part where the steering column 15 is fastened to the vehicle body at a point closer to the front wheels is formed as a mechanism that allows free pivoting; this part constitutes the pivoting center in the tilt operation (see Figures 1A and 1B). This part is constructed from a column-supporting member A, a pivoting-supporting bracket B, and shaft-supporting members 10. This column-supporting member A is constructed from a supporting bottom part 1, and supporting side parts 2, 2 which are formed on both sides of this supporting bottom part 1 in the direction of width. Furthermore, slot parts A_1, A_1 are respectively formed in the supporting side parts 2, 2 (See Figures 2A, 2B and 3B).

The front-end part of the steering column 15 is fastened so that this part is surrounded by the supporting bottom part 1 and both supporting side parts 2, 2. In concrete terms, connecting parts 2a, 2a are respectively formed from the rear ends (closer to the steering wheel W) of the two supporting side parts 2, 2, and these connecting parts 2a, 2a are fastened to the steering column 15 by welding. Furthermore, a reinforcing plate member 5 is connected and fastened to the upper ends of the two supporting side parts 2, 2 by welding.

Each of the slot parts A_1 formed in the respective supporting side parts 2 comprises a pivoting hole part 3a, a slot-form sliding hole part 3b and a partitioning member 4. The aforementioned pivoting hole part 3a and sliding hole part 3b are formed so that these parts are connected. The pivoting hole part 3a and sliding hole part 3b are demarcated by the partitioning member 4 (see Figure 6A). The dimension of this sliding hole part 3b in the direction of width perpendicular to the direction of length is substantially the same dimension at all points along the direction of length, resulting in a width dimension that allows the sliding hole part 3b to move smoothly in the direction of length relative to the shaft-supporting member 10 (described later).

The aforementioned partitioning members 4 have the form of a shaft or rod, and are formed so that these members protrude from one side of each slot part A_1 toward the other side in the direction of width (i. e., in the direction that is perpendicular to the direction of length) (see Figure 6B). These partitioning members 4 are caused to collapse by the pressing force that arises from the impact load of the shaft-supporting members 10 (described later). This collapsed state is a state in which the partitioning members 4 are pushed over from the root portions of the partitioning members 4 (see Figure 6C).

Recessed parts 3c are formed which extend in the direction of each sliding hole part 3b from the vicinity of the attachment root between the sliding hole part 3b and the partitioning member 4 (see Figure 6A). These recessed parts 3c are arranged so that when the partitioning members 4 are pushed over, these partitioning members 4 enter the recessed parts 3c (see Figure 6C). Furthermore, there is also an embodiment in which escape parts 3d are formed in the attachment roots between the pivoting hole parts 3a and partitioning members 4 (see Figure 8A).

The abovementioned escape parts 3d allow a substantial increase in the length of the partitioning members 4; accordingly, the distance between the contact points of the partitioning members 4 and the shaft-supporting members 10 is increased, so that the bending moment that is obtained when the partitioning members 4 are pushed over can be increased. Next, there is also an embodiment in which the aforementioned partitioning members 4 are formed so that these members extend continuously from one side of each of the aforementioned slot parts A_1 to the other side in the direction of width, and in which a weak part 4a is formed [in each partitioning member 4] at a location on the abovementioned second side [of the slot part A_1] (see Figure 8B).

Specifically, [in this embodiment,] the partitioning members 4 are formed so that the respective ends of the partitioning

members 4 in the direction of length are connected to both sides of the slot parts A_1 in the direction of width. then, the aforementioned weak part 4a is formed as a part with a narrowed width (see Figure 8A), or a cut-out part (see Figure 8B). Moreover, when the partitioning members 4 are caused to collapse, stress is concentrated in the weak parts 4a. Furthermore, there is also an embodiment in which bent parts 4b are formed in the partitioning members 4, with these bent parts having a zigzag shape or folded linear shape (see Figure 8C). A plurality of these bent parts 4b are formed, and when the partitioning members 4 are caused to collapse, these bent parts 4b are caused to extend more or less rectilinearly in the direction of the slots.

Next, the pivoting-supporting bracket B is fastened to the vehicle body side, and the aforementioned column-supporting member A is connected to this pivoting-supporting bracket B so that the column-supporting member A is free to pivot (see Figure 1A). This pivoting-supporting bracket B is constructed from connecting members 6, 6 which are formed on both sides in the direction of width, and a connecting plate member 7 which connects and supports the connecting members 6, 6 (see Figure 2A). Each of the connecting members 6 comprises a pivoting-supporting surface 6a and a top surface 6b. Furthermore, the aforementioned connecting plate member 7 is fastened to the top surfaces 6b, 6b of the two connecting members 6, 6. Pivoting-supporting hole parts 8 are formed in the pivoting-

supporting surfaces 6a of the connecting members 6. Furthermore, fastening holes 9, 9 used for attachment to specified locations on the vehicle body are formed in the aforementioned top surfaces 6b, 6b and connecting plate member 7 (See Figures 1B, 2A and 2B).

The spacing of the pivoting-supporting surfaces 6a, 6a of the two connecting members 6, 6 is a spacing that allows clamping of both supporting side parts 2, 2 of the aforementioned column-supporting member A. This column-supporting member A and the pivoting-supporting bracket B are connected via the shaft-supporting members 10 so that these parts are free to pivot. In each shaft-supporting member 10, a flange part 10b is formed on the end portion of a shaft part 10a. Furthermore, the positions of the pivoting hole parts 3a of the slot parts A_1 of the aforementioned column-supporting member A and the pivoting-supporting holes parts 8 of the aforementioned pivoting-supporting bracket B are aligned, and the shaft parts 10a of the aforementioned shaft-supporting members 10 are inserted [into these parts]. Caulking is performed on the opposite ends of the shaft parts 10a from the ends on which the flange parts 10b are formed, so that expanded portions 10c are formed (see Figure 4B).

Under ordinary conditions, the shaft parts 10a of the shaft-supporting members 10 are positioned by the partitioning members 4 on the sides of the pivoting hole parts 3a inside

the aforementioned slot parts A_1. As a result, the shaft parts 10a of the aforementioned shaft-supporting members 10 are surrounded by the pivoting hole parts 3a and partitioning members 4, so that the shaft parts 10a are positioned in a stable state, with looseness of the partitioning members 4 being prevented. Furthermore, the aforementioned column-supporting member A has a structure which allows the pivoting action of the column-supporting member A caused by the tilting operation to be performed smoothly with respect to the aforementioned pivoting-supporting bracket B (see Figure 5). Moreover, the flange parts 10b of the shaft-supporting members 10 contact the partitioning members 4 and the areas around the pivoting hole parts 3a, so that a state of uniform contact can be achieved (see Figure 6B).

When the vehicle is involved in a collision, a shock is generated, and the rebound action causes the vehicle operator to strike the steering wheel W. Accordingly, the impact energy absorbing function of the tilt operating bracket which supports the steering wheel W and the portion of the column-supporting member A that is located near the steering wheel W acts so that the column-supporting member A moves along the axial direction toward the front wheels. When the column-supporting member A moves along the axial direction toward the front wheels, the shaft-supporting members 10 are interposed between the column-supporting member A and the pivoting-supporting bracket B that supports the area on the side of the

front wheels, so that the column-supporting member A slides (see the solid line and imaginary line in Figure 1B).

First, the shaft-supporting members 10 are positioned in the pivoting hole parts 3a of the slot parts A_1 by the partitioning members 4. However, when the column-supporting member A is caused to move toward the front wheels by the rebound action of the abovementioned impact, the partitioning members 4 collide with the shaft-supporting members 10, and the shaft parts 10a of the shaft-supporting members 10 cause the partitioning members 4 to collapse so that the partitioning members 4 are pushed over with the attachment roots of the partitioning members 4 as the substantial centers of rotation (see Figures 7A and 7B).

In this case, the impact energy is absorbed in the process of collapse of the partitioning members 4. In this case, furthermore, it is possible to arrange the apparatus so that the collapsed partitioning members 4 enter the recessed parts 3c of the slot parts A_1, thus preventing the narrowing of the hole width dimension in the boundary areas between the pivoting hole parts 3a and sliding hole parts 3b. As a result, the slot parts A_1 slide toward the front wheels relative to the shaft parts 10a of the aforementioned shaft-supporting members 10, so that the column-supporting member A on the side of the front wheels can move toward the front wheels (see Figure 7C).

In the abovementioned process, [when] the vehicle operator is caused to strike the steering wheel W by the rebound action of the impact during a collision, the column-supporting member A moves toward the front wheels while being supported by the tilt operating bracket and the pivoting-supporting bracket B, and while the impact energy is absorbed by the energy absorbing function provided in these parts, so that the safety of the vehicle operator can be ensured.

The invention of claim 1 is a tilt steering pivoting-supporting structure in which slot parts A_1 in a column-supporting member A which is fastened to the front-wheel side of the steering column are connected via shaft-supporting members 10 to a pivoting-supporting bracket B which is fastened to the vehicle body side, the aforementioned shaft-supporting members 10 are enveloped and supported at the front-wheel ends of the slot parts A_1 by partitioning members 4 that are formed inside the aforementioned slot parts A_1, and the aforementioned partitioning members 4 are caused to collapse in the case of an impact so that the slot parts A_1 can move toward the front wheels relative to the aforementioned shaft-supporting members 10. As a result, the following merits are obtained: specifically, looseness of the pivoting center in the tilting operation performed to adjust the height position of steering wheel W can be suppressed, so that the pivoting operation can be performed extremely smoothly.

Furthermore, in the case of a collision, the sliding action of the steering column 15 in shock absorption can be improved.

To describe the abovementioned merits in greater detail, the shaft-supporting members 10 that connect the column-supporting member A and the pivoting-supporting bracket B fastened to the vehicle body side are enveloped and supported (under ordinary conditions) between the column-supporting member A and the pivoting-supporting bracket B via the partitioning members 4 at the front ends of the slots A_1 formed in the aforementioned column-supporting member A, so that the positions of these shaft-supporting members 10 are maintained, thus allowing these shaft-supporting members 10 to serve as a pivoting center for tilt adjustment in which looseness is suppressed. As a result, the aforementioned column-supporting member A can perform a stable pivoting action in which looseness is suppressed at the time of tilt adjustment.

Furthermore, in a case where the vehicle operator is caused to strike the steering wheel W by the rebound action resulting from the impact generated in the case of a collision, so that the aforementioned column-supporting member A tends to move toward the front wheels relative to the aforementioned pivoting-supporting bracket B, the shaft-supporting members 10 which are positioned between the pivoting-supporting bracket B and the column-supporting member A while being pushed toward the front ends of the aforementioned slot parts A_1 by the

aforementioned partitioning members 4 cause the partitioning members 4 to collapse, and in this process, the initial impact is favorably alleviated.

Next, the invention of claim 2 is a tilt steering pivoting-supporting structure which comprises a column-supporting member A in which slot parts A_1 each comprising a pivoting hole part 3a, a sliding hole part 3b which is formed as a continuation of the pivoting hole part 3a and a partitioning member 4 which is formed at the boundary between the aforementioned pivoting hole part 3a and sliding hole part 3b and which is caused to collapse by a specified load are formed, a pivoting-supporting bracket B which is fastened to the vehicle body side, and shaft-supporting members 10 which connect the aforementioned column-supporting member A and pivoting-supporting bracket B, wherein the shaft-supporting members 10 are enveloped and supported inside the aforementioned pivoting hole parts 3a by the aforementioned partitioning members 4, and the aforementioned partitioning members 4 are caused to collapse in the case of an impact so that the slot parts A_1 can move toward the front wheels relative to the aforementioned shaft-supporting members 10. As a result, the following merits are obtained: specifically, a smooth pivoting action in which looseness of the pivoting center is suppressed can be performed in the tilting operation, and shock absorption in the case of a collision can

be accomplished in a favorable manner; furthermore, an extremely simple structure is possible.

To describe the abovementioned merits in greater detail, each of the slot parts A_1 of the column-supporting member A is constructed from a pivoting hole part 3a, a sliding hole part 3b which is formed as a continuation of this pivoting hole part 3a, and a partitioning member 4 which is formed at the boundary between the aforementioned pivoting hole part 3a and sliding hole part 3b. The column-supporting member A is connected by the shaft-supporting members 10 to the pivoting-supporting bracket B fastened to the vehicle body side; furthermore, the shaft-supporting members 10 are enveloped and supported inside the aforementioned pivoting hole parts 3a by the aforementioned partitioning members 4. As a result, the shaft-supporting members 10 can act as pivoting centers in which looseness is suppressed in the tilt adjustment.

Furthermore, the partitioning members 4 are caused to collapse by a specified load; accordingly, as a result of the force of the movement of the column-supporting member A toward the front wheels that occurs when the vehicle operator is caused to strike the steering wheel W by the rebound action resulting from the impact of a collision, the shaft-supporting members 10 cause the aforementioned partitioning members 4 to collapse, and the impact energy can be absorbed in the process of this collapse, so that the impact can be alleviated in a

favorable manner. Furthermore, the energy absorption load can easily be set by variously altering the shape and width of the buckling parts of the partitioning members 4 (i. e., the positions where bending occurs at the time of collapse) or the positions of contact with the shaft-supporting members 10, etc.

As was described above, since there is an energy absorbing mechanism in the tilt supporting structure, the tilt support under ordinary conditions can be maintained in a stable supporting state in both the radial and axial directions of the shaft-supporting members 10. Consequently, looseness of the tilt pivoting center parts can be prevented. Accordingly, tilt adjustment can be performed in a stable state, and the supporting strength can be increased.

Furthermore, even though the slots (sliding hole parts 3b) in the slot parts A_1 used for energy absorption and the supporting holes (pivoting hole parts 3a) for tilt pivoting communicate with each other, an appropriate clearance of the aforementioned shaft-supporting members 10 and column-supporting member A can easily be set, so that the contact clearance between the aforementioned shaft-supporting members 10 and the pivoting hole parts 3a of the aforementioned column-supporting member A can be made more or less uniform. Accordingly, the pivoting of the steering column 15 in tilt adjustment can be improved.

Next, the invention of claim 3 is the tilt steering pivoting-supporting structure according to claim 1 or 2, wherein the aforementioned partitioning members 4 are formed continuously from one side of each of the aforementioned slot parts A_1 to the other side in the direction of width, and a weak part 4a is formed at the second end [of each partitioning member 4]. As a result, the fixing of the positions of the partitioning members 4 is stabilized, and the partitioning members 4 can be pushed over more easily via the weak parts 4a. Furthermore, the strength of the absorbing force can be set in accordance with the vehicle type by adjusting the size of the weak parts 4a.

Next, the invention of claim 4 is the tilt steering pivoting-supporting structure according to claim 1, 2 or 3, wherein cut-out escape parts 3d are formed at the attachment roots of the aforementioned pivoting hole parts 3a and the aforementioned partitioning members 4. As a result, the length of the partitioning members 4 can be substantially lengthened, so that the distance between the attachment root parts and the contact points between the partitioning members 4 and the shaft-supporting members 10 is increased. Accordingly, the bending moment that occurs when the partitioning members 4 are pushed over can be increased, so that [the partitioning members 4] can easily be deformed (caused to collapse).

CLAIMS

1. A tilt steering pivoting-supporting structure, wherein slot parts in a column-supporting member which is fastened to the front-wheel side of the steering column are connected via shaft-supporting members to a pivoting-supporting bracket which is fastened to the vehicle body side, said shaft-supporting members are enveloped and supported at the front-wheel ends of the slot parts by partitioning members that are formed inside said slot parts,

and said partitioning members are caused to collapse in the case of an impact so that the slot parts can move toward the front wheels relative to said shaft-supporting members.

2. A tilt steering pivoting-supporting structure comprising:

a column-supporting member in which slot parts each comprising a pivoting hole part, a sliding hole part which is formed as a continuation of the pivoting hole part and a partitioning member which is formed at the boundary between said pivoting hole part and sliding hole part and which is caused to collapse by a specified load are formed;

a pivoting-supporting bracket which is fastened to the vehicle body side; and

shaft-supporting members which connect said column-supporting member and pivoting-supporting bracket; wherein the shaft-supporting members are enveloped and supported inside said pivoting hole parts by said partitioning members, and said partitioning members are caused to collapse in the case of an impact so that the slot parts can move toward the front wheels relative to said shaft-supporting members

3. The tilt steering pivoting-supporting structure according to claim 1 or 2, wherein said partitioning members are formed continuously from one side of each of said slot parts to the other side in the direction of width, and a weak part is formed at the second end of each partitioning member.

4. The tilt steering pivoting-supporting structure according to claim 1, 2 or 3, wherein cut-out escape parts are formed at the attachment roots of said pivoting hole parts and said partitioning members.

5. A tilt steering pivoting-supporting structure substantially as hereinbefore described with reference to any of the examples shown in the accompanying drawings.

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Application No:	GB 0119364.8	**Examiner:**	Richard Chee Cheung So
Claims searched:	1 to 5	**Date of search:**	8 November 2001

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Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.S): B7B (BSBNC, BSDA).

Int Cl (Ed.7): B60R 21/09; B62D (1/16, 1/18, 1/19).

Other: Online:- EPODOC, JAPIO, WPI.

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
A	GB 2350329 A	(NASTECH EUROPE LIMITED). Claim 1, figure 1 in particular to annotation 9 and page 3 lines 15 to 18.	-
A	EP 0818379 A2	(FORD GLOBAL TECHNOLOGIES). Figs. 7 to 9, column 4 lines 8 to 12, claim 7 lines 15 to 26, and claim 10 column 8 line 55 to column 9 line 9.	-
A	US 5954363	(CYMBAL et al.). Figure 5 in particular to 82 and column 3 line 58 to column 4 line 20.	-
A	US 5802926	(THOMAS). Column 4 lines 7 to 15 and 25 to 31.	-

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
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